

WHAT IS CLAIMED IS:

- 1 1. A method for determining the thickness of a ferromagnetic material
- 2 having known conductivity and permeability comprising the steps of:
- 3 (a) engaging a constant signal with the ferromagnetic material
- 4 for inducing a changed signal,
- 5 (b) generating a stepped saturation signal over a range of
- 6 currents for engagement with the ferromagnetic material,
- 7 (c) detecting the changed signal as the saturation signal is
- 8 varied over the range of currents,
- 9 (d) determining the relationship between the changed signal
- 10 and the stepped saturation signal, and
- 11 (e) evaluating the thickness of the material based upon the
- 12 relationship between the changed signal and the stepped
- 13 saturation signal.

2. The method defined in claim 1 for determining the thickness of a ferromagnetic material having known conductivity and permeability wherein the step of determining the relationship between the changed signal and the stepped saturation signal comprises the steps of:

- (a) for a plurality of thicknesses, normalizing the changed signal,
- (b) plotting the normalized changed signal versus the stepped saturation signal for generating a normalized curve for each thickness of material,
- (c) determining the deviation of each normalized curve from a standard curve for each thickness of material, and
- (d) determining a total deviation associated with each normalized curve for each thickness.

3. The method defined in claim 1 for determining the thickness of a ferromagnetic material having known conductivity and permeability wherein the step of evaluating the thickness of the material based upon the relationship between the changed signal and the stepped saturation signal comprises the steps of:

- (a) deriving a function from the relationship of the deviation of each normalized curve for each thickness of material, and
- (b) evaluating the thickness of the material based upon the function such that for any deviation a thickness can be determined.

1 4. A method for determining the thickness of a ferromagnetic material
2 having known conductivity and permeability comprising the steps of:

3 (a) engaging a constant signal with the ferromagnetic material
4 for inducing a changed signal,

5 (b) generating a saturation signal over a range of currents for
6 engagement with the ferromagnetic material,

7 (c) detecting the changed signal as the saturation signal is
8 varied over the range of currents,

9 (d) determining the relationship between the changed signal
10 and the saturation signal, further comprising:

11 (1) for a plurality of thicknesses, normalizing the changed
12 signal,

13 (2) plotting the normalized changed signal versus the
14 stepped saturation signal for generating a normalized
15 curve for each thickness of material,

16 (3) determining the deviation of each normalized curve
17 from a standard curve for each thickness of material,
18 and

19 (4) determining a deviation associated with each
20 normalized curve for each thickness, and

21 (e) evaluating the thickness of the material based upon the
22 relationship between the changed signal and the saturation
23 signal, further comprising:

24 (1) deriving a function from the relationship of the
25 deviation of each normalized curve for each thickness
26 of material, and

27 (2) evaluating the thickness of the material based upon
28 the function such that for any deviation a thickness is
29 determined.

1 5. An apparatus for determining the thickness of a ferromagnetic
2 material having known conductivity and permeability comprising:

3 (a) a transmitter for engaging a constant signal with the
4 ferromagnetic material for creating a changed signal,

5 (b) a saturation device for generating a saturation signal over a
6 range of currents for engagement with the ferromagnetic
7 material,

8 (c) a receiver for detecting the changed signal as the saturation
9 signal is varied over the range of currents,
10 such that the relationship between the changed signal and
11 the saturation signal is determined, and the thickness of the
12 material based upon the relationship is determined.

1 6. A method for determining the thickness of a ferromagnetic material
2 having known conductivity and permeability comprising the steps of:

3 (a) engaging a constant signal with the ferromagnetic material
4 for inducing an changed signal,

5 (b) generating a swept saturation signal over a range of current
6 for engagement with the ferromagnetic material,

7 (c) detecting the changed signal as the saturation signal is
8 swept over the range of currents,

9 (d) determining the relationship between the changed signal
10 and the swept saturation signal, and

11 (e) evaluating the thickness of the material based upon the
12 relationship between the changed signal and the swept
13 saturation signal.

1 7. The method defined in claim 6 for determining the thickness of a
2 ferromagnetic material having known conductivity and permeability wherein the
3 step of determining the relationship between the altered transmitter signal and
4 the swept-frequency saturation signal comprises the steps of:

- 5 (a) for a plurality of thicknesses, normalizing the changed
6 signal,
7 (b) plotting the normalized changed signal versus the swept
8 saturation signal for generating a normalized curve for each
9 thickness of material,
10 (c) determining the deviation of each normalized curve from a
11 standard curve for each thickness of material, and
12 (d) determining a deviation associated with each normalized
13 curve for each thickness.

1 8. The method defined in claim 6 for determining the thickness of a
2 ferromagnetic material having known conductivity and permeability wherein the
3 step of evaluating the thickness of the material based upon the relationship
4 between the changed signal and the swept saturation signal comprises the steps
5 of:

- 6 (a) deriving a function from the relationship of the deviation of
7 each normalized curve for each thickness of material, and
8 (b) evaluating the thickness of the material based upon the
9 function such that for any deviation a thickness can be
10 determined.

- 1 9. A method for determining the thickness of a ferromagnetic material
2 having known conductivity and permeability comprising the steps of:
- 3 (a) engaging a constant signal with the ferromagnetic material for
4 creating an changed signal,
- 5 (b) generating a saturation signal over a range of currents for
6 engagement with the ferromagnetic material,
- 7 (c) detecting the changed signal as the saturation signal is varied
8 over the range of currents,
- 9 (d) determining the relationship between the changed signal and
10 the saturation signal, further comprising:
- 11 (1) for a plurality of thicknesses, normalizing the changed
12 signal,
- 13 (2) plotting the normalized changed signal versus the
14 saturation signal for generating a normalized curve for
15 each thickness of material,
- 16 (3) determining the deviation of each normalized curve from
17 a standard curve for each thickness of material, and
- 18 (4) determining a deviation associated with each normalized
19 curve for each thickness, and
- 20 (e) evaluating the thickness of the material based upon the
21 relationship between the changed signal and the saturation
22 signal, further comprising:
- 23 (1) deriving a function from the relationship of the deviation
24 of each normalized curve for each thickness of material,
25 and

26 (2) evaluating the thickness of the material based upon the
27 function such that for any deviation a thickness is
28 determined.

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